

Hailing from the skyscrapered shores of Hong Kong, the Laser 200 is a surprisingly late arrival from this Land of Technology. Has it been worth the wait?

What is this I see before me? Looking rather like a well-fed, albino version of the ZX Spectrum, the Laser 200 is a rather late entry into the low-cost home computer market from Hong Kong. Quite typically, this origin means that it's very cheap indeed — the basic unit retails for £70. However, there is rather more to the story than simply a low price tag, so let's dig a little deeper and see how appealing the Laser is.

#### A case in point

The Laser has been designed along the same general lines as the ZX Spectrum. Covering a slightly larger area than the Spectrum and about twice as thick, it consists of little more than a sloping keyboard with the electronics tucked in underneath. The keys are made of the same hard rubber (or dead flesh, depending on your point of view) as the Spectrum, and number 45 rather than the latter's 40. The case is cream with a dark brown keyboard surround and light brown keys — all the key legends are in white and are easy to read. An LED at the top right of the keys indicates when the computer is powered up.

Like the Spectrum, the Laser 200 allows single keystroke entry of BASIC keywords: but unlike the Spectrum it doesn't insist on them. This is good. Beginners will be able to spell the words out in full to begin with, gradually changing over to the single key entry as they learn where all the various functions are located. This is easier to pick up than on the Spectrum, where the keyword locations are sometimes a little illogical: on the Laser, words that form natural groupings are located on adjacent keys (like IF-THEN-ELSE, FOR-TO-STEP-NEXT, SET-RESET-POINT and PEEK and POKE). Furthermore all the words in a given grouping need the same type of Shift operation to get the keyword.

There are two function keys, Shift and Control, and none of the other keys has more than four functions. Unshifted, the keys produce the alphanumeric set and some of the punctuation. Pressing Shift with a key gives the rest of the punctuation, the arithmetic operators and the block graphics. Control and a key gives the BASIC keyword marked above the key, while Control-Return, then a key gives the keyword below. (This latter procedure is similar to Sinclair's extended mode). One oddity when using single-key entry; if the keyword requires brackets as in STR\$(X), then for some functions the leading bracket is printed for you, sometimes it isn't. Oh, well, just remember to keep your eyes on the screen....

Laser 200 COLOUR COMPUTER -4K

# LASER

On our way round to the back of the computer, we take a slight detour on to the right-hand side where an on/off switch is located. There is, strictly speaking, no real need for this as the Laser isn't mains-powered but uses a separate low voltage power pack like most other computers of this size. However, it's marginally more convenient to flip the switch for a hard reset, should you need one, than reach round and pull out the plug. A trifling point, really.

From left to right across the back panel we have, first of all, the 9 V DC input socket for the power supply, then the tape socket. Yes, socket — singular. Unusually, the Laser has a stereo jack socket rather than the normal twin sockets, but it does have a tape lead supplied with the required connector and the standard plugs at the cassette end. No remote control of the cassette recorder motor is provided.

Next comes a monitor output, rare (and commendable) in a machine of this price, followed by the two printed circuit board edge connectors for the memory expansion and peripherals. Finally comes the UHF TV output socket, tuned to Channel 36 or thereabouts as usual.

Thus endeth the guided tour. Also included in the purchase price are a TV lead (too short for comfortable viewing with a domestic TV set, like most other computers), a User manual, a demonstration tape, a BASIC Reference manual and a slim booklet of example programs.

#### Turning on

On power-up the Laser 200 simply says READY. No Microsoft copyright message (for it is they who wrote the BASIC), no message giving the number of bytes free — just READY and a flashing cursor. You can't check how much free memory there is with FRE(0) or SIZE, since such a statement isn't supported. The display is yellow text on a green background, which I promptly messed up by POKEing random graphics all over the place to see what the screen capabilities were. This led to an interesting discovery when I tried to clear the screen. There is no key provided for clearing the screen, so it's necessary to use CLS in immediate mode. But with random patterns on the screen the remainder of the line must be cleared with spaces to prevent a syntax error. In doing this, I overshoot onto the next line and instead of overwriting



reserved using CLEAR), and the surprising IF-THEN-ELSE which some more expensive machines do not have. Arrays can have up to three dimensions. I/O functions are supported by INP and OUT, and USR calls to machine code routines may be made.

The cassette commands are the standard CLOAD, CSAVE and VERIFY, plus CRUN which loads a program and autoruns it. For some reason the manual insists in quite strong terms that you must always start the tape running before hitting Return during any tape operation: I can understand this for CSAVE, where you might lose some of the leader, but not for the other three, and the machine didn't complain when I broke the rules. Named data files may be stored on tape using PRINT #, and loaded into variables using INPUT #.

### Graphics

There are two graphics modes. The text mode, which the Laser always defaults to when a program isn't running, is MODE(0) — it insists on the brackets — and gives a 32 by 16 display. Text is upper case only. Selecting inverse text gives you the same two colour combinations with the foreground and background reversed. Since the Laser uses a separate display code for each of the normal and inverse characters, that takes care of half of the possible 256 displayable characters. The other 128 display codes are assigned to eight repetitions of the 16 text mode block graphics characters, one set for each of the eight foreground colours in this mode (green, yellow, blue, red, buff, cyan, magenta and orange). You can have any background colour you like for the block graphics so long as it's black. Indeed, the only way to get black on the screen at all is as part of a text mode graphics block.

Note the use of display codes rather than ASCII codes: like the PET, Sharp and other machines, to get an 'A' on the screen you can either PRINT CHR\$(65) or POKE 28762,1.

In the high-res graphics mode, MODE (1), the pixel resolution is 128 by 64, rather poor by today's standards. The colour set is also restricted in this mode, with a choice of two sets. There's a green background with green, yellow, blue and red foreground colours, or a buff background with buff, cyan, magenta and orange foreground. No text can

be displayed in MODE (1), and the only pixel manipulation commands are limited to SET, RESET and POINT (returns the colour of the tested pixel). No line drawing commands, no CIRCLE, no flashing from hardware. Sigh.

Resorting to machine code can give much better possibilities, as in the 'intro' and 'outro' sections of the demo tape. This program is not recommended for epileptics!

### Sound

The SOUND command is not much of an improvement on that of the Spectrum, though it is louder. Two parameters can be specified, to give 31 frequencies and nine different durations. OK for simple tunes and games sound effects, but nothing advanced.

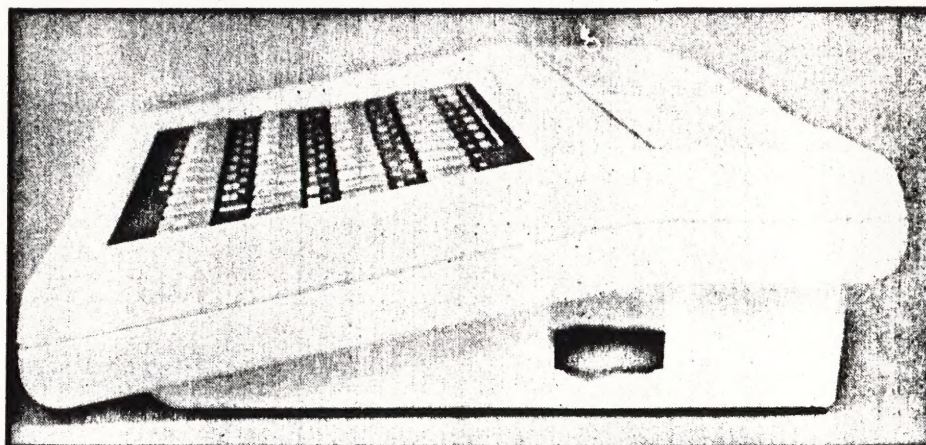
### Expansion

The 4K user RAM of the basic Laser 200 may be expanded by the addition of a 16K module, which we tested, or a 64K module, which we didn't. The module seemed rather chunky compared to RAM packs for other computers and we couldn't resist opening it up to take a look. Underneath the layers of metal, presumably for RF shielding, we discovered a small switched mode power supply, amongst other things. This is probably generating 12 V and suggests that the price has been kept down by using the older multi-rail supply chips, rather than the modern single rail 5 V versions.

The peripheral port will take an add-on printer interface which will drive the Seikosha GP-100 and GP-100A printers (according to the manual), or any Centronics printer (according to the synopsis on the packaging). The relevant commands are LLIST, LPRINT and COPY; the manual doesn't go into details about what happens to the various colours when the high-res screen is dumped.

Again, according to the packaging there is a light pen and a joystick which may be connected to the peripheral port, though no mention is made of how to program for them. The details are probably included with the accessories, and we were not supplied with either.

The question of possible disc drives is even more vague: the only reference to them is in the list of error messages at the back of the manual, which includes DISK COMMAND as one entry.



An on-off switch is provided on the side of the Laser.

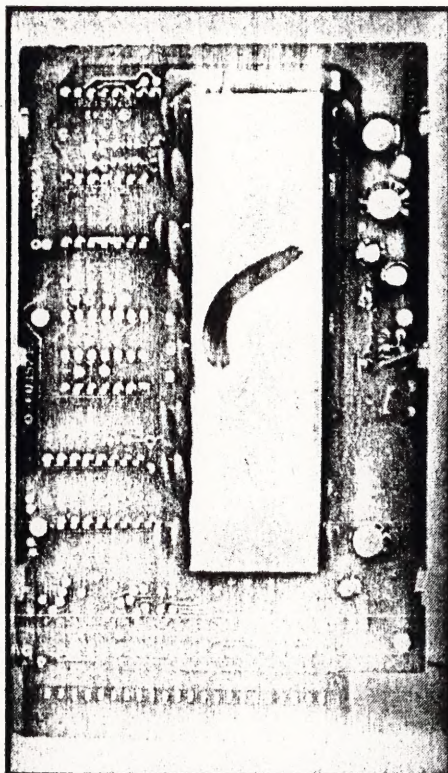
# 200

that too, the Laser 'opened up' a new line by scrolling the remainder of the screen down a line. An attempt to repeat this on the next line failed, as the cursor refused to move past the end of the second line. The point of all this is that the BASIC is designed to prevent the input of anything longer than two lines, and since the screen is only 32 columns wide, program lines can only be 64 characters long including the line number. This is rather less than the 80-character lines Microsoft normally allows.

Another annoying feature is the action of the Delete key. Instead of being a combined backspace-and-delete, it is necessary to use the cursor keys to position the cursor over the first of the offending characters. Delete then removes that character and pulls the end of the line back by one character, so making a correction could take twice as many keypresses as usual. Fortunately the auto key repeat speeds things up but it was a little difficult to get used to.

Apart from these quirks the BASIC is pretty much standard Microsoft, with multistatement lines, the usual maths functions, the usual string handling functions (sufficient memory for string operations must be





Inside the Ram pack we find the memory chips under metal shielding, and a switched mode psu down the right of the PCB.

#### The documentation

The manuals for the Laser 200 are no worse than those for many other computers, and are better than some. There's the usual smattering of spelling mistakes, most of which are harmless, and the level is pitched at the rank beginner. Unfortunately the manual has equated simplicity with

#### BENCHMARK

|         |      |
|---------|------|
| BMI     | 1.7  |
| BM2     | 7.0  |
| BM3     | 17.0 |
| BM4     | 17.4 |
| BM5     | 19.3 |
| BM6     | 31.6 |
| BM7     | 48.8 |
| BM8     | 72.5 |
| Average | 26.9 |

#### The Benchmark test results.

brevity in many places, and a beginner may need rather more explanation of some aspects. The sample programs are all short and quite basic.

I particularly liked page 21, which had a drawing of the screen with SYNTAX ERROR displayed on it, and beneath it the explanation, "This means SYNTAX ERROR..."

#### Conclusions

Throughout this review I have made comparisons between the Laser 200 and the Spectrum, which one tends to do instinctively given their similar appearance. In reality this is probably an unfair comparison, because although the Laser costs

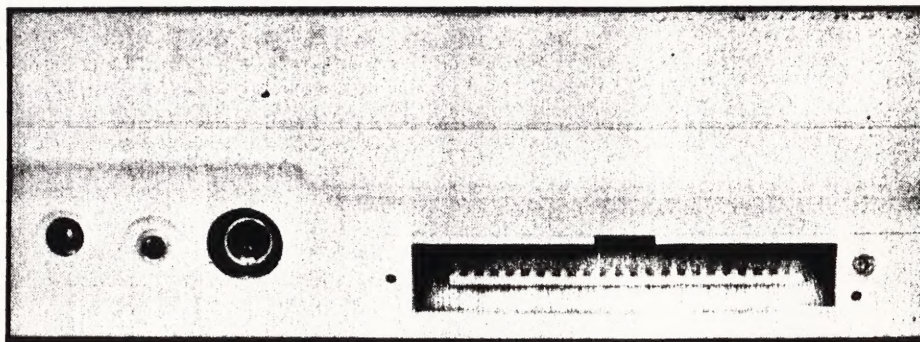
#### TIME

|      |
|------|
| 1.7  |
| 7.0  |
| 17.0 |
| 17.4 |
| 19.3 |
| 31.6 |
| 48.8 |
| 72.5 |
| 26.9 |

only £70, the basic computer has only 4K of memory and the price of a 16K RAM pack takes the price up to that of a 16K Spectrum, which offers much better graphics and more facilities for expansion now that the Microdrives and networking are available. (On the other hand, the 64K expansion takes the price to that of a 48K Spectrum). Perhaps a fairer comparison for the basic machine would be one made with the ZX81, another computer intended as a low-cost entry into computing but with an inferior keyboard and no sound and colour.

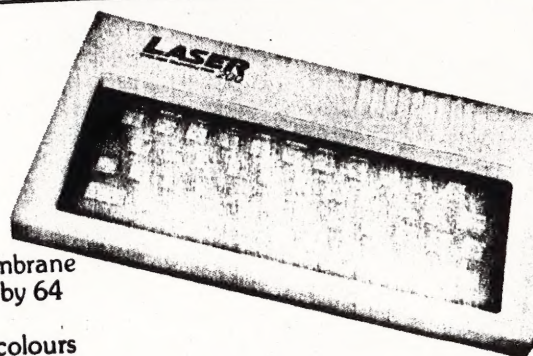
Unfortunately Sir Clive, with his usual consummate timing in these matters, has just dropped his price to £45 for a ZX81, 16K RAM pack and software cassette, forcing people to decide whether it is worth paying the extra £25 for sound, colour and a quarter of the memory: not to mention the vast amount of software available for the two Sinclair machines which widens the gap even further. It seems that the Laser 200 has fallen between several stools, and it may remain there unless the distributors can stimulate the interest of the commercial software houses.

Below: The back of the Laser 200 showing the memory expansion bus.



#### FACTSHEET

|              |  |
|--------------|--|
| CPU          | Z80A   |
| ROM          | 16K  |
| RAM          | 4K (expandable to 16 or 64K)   |
| Language     | Microsoft BASIC  |
| Keyboard     | 45-key multifunction, moving rubber membrane   |
| Display      | Text mode: 16 lines of 32 characters, 32 by 64 pixel graphics in eight colours plus black.<br>High-res mode: 64 by 128 pixels in four colours (choice of two sets), no text.<br>TV or monitor output |
| Cassette I/O | 600 baud<br>Centronics printer interface, lightpen, joysticks, bus for memory expansion  |
| Sound        | Single channel, 31 notes, 9 durations  |
| Costs        | Laser 200 £69.95<br>16K RAMpack £29.95<br>64K RAMpack £59.95<br>Printer interface £19.95<br>Joysticks £19.95 per pair<br>Lightpen £19.95   |



**Supplier** Computers For All,  
Southfields Industrial Park,  
30 Hornsby Square,  
Laindon,  
Essex  
Telephone 0268 418414